

## Progress on the Biological Control Program Against Purple Loosestrife in California

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Four biological control agents of purple loosestrife, *Lythrum salicaria* L., have been released in small numbers in California since 1996. The insects released are two leaf-feeding beetles, *Galerucella californiensis* L., and *G. pusilla* (Dufft). (Coleoptera: Chrysomelidae), a root boring weevil, *Hylobius transversovittatus* Goeze and the flower-bud weevil, *Nanophyes marmoratus* (Goeze) (Coleoptera: Curculionidae). They were either collected or obtained from cooperators in Oregon, Washington and Cornell University in New York.

Surveys for establishment by the root-boring weevil were made at two selected sites in Shasta County. In order to minimize destructive sampling, a transect through each of the two release sites was established and 10 plants were dug up and their roots examined for boring damage by the weevil larvae. At one site that received releases of 100 weevils during 2000 and again in 2001, four of 10 plants displayed damage. At a second site that received a release of 100 weevils in 2001, only two of 10 plants had weevil larval damage. These are the first recoveries of this weevil in California. Similar transects will be done at other release sites in the future. No releases of *Hylobius transversovittatus* were made during 2002.

The flower-bud weevils (*Nanophyes marmoratus*) have been released at several sites in Butte and Shasta counties. The weevils damage purple loosestrife through adult feeding of the foliage and larval feeding that causes flower-bud abortion thus reducing the seed output by the plants. It appears that they have more than one generation per year. They readily establish and at one site in Butte County have been recovered in low numbers. The weevils also quickly colonized in Shasta County and were recovered in fair numbers during 2002 at a 2001 release site. Approximately 1,600 flower-bud weevils, received from Oregon on August 2002, were released at three sites in Shasta County.

Approximately 10,000 leaf-feeding beetles, *Galerucella californiensis* and *G. pusilla* were released at five sites in Butte, Kern, and Shasta counties during 2000. The leaf beetles were collected in the Moses Lake area of central Washington in late May 2002, and delivered overnight to California. Butte and Kern each made 1,000 leaf beetle releases. This is the second year of a renewed program to release large numbers of these leaf-feeding beetles in California. Recoveries of the leaf beetles have been very encouraging in Kern and Shasta counties. The Butte County 2001 release site was chemically sprayed out by the property owner. Initial recoveries have been made at all sites released during 2001 in Kern and Shasta counties. Some recoveries were made in 2002 at some of the 1998 through 2000 release sites. At previous release sites, 1998 through 2000 where additional large releases were made, recoveries as well as damage were more pronounced. Adults were noted at the monitoring sites from May through July. It is assumed that the beetles go into diapause sometime after the F1 generation emerges in July. Preliminary observations in Kern County in early May 2003 suggests establishment there. Initial releases occurred in Kern County in 1999. Monitoring studies to quantify the damage by the beetles will be developed during 2003 and implemented at selected sites in Kern and Shasta counties.

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